From Minnesota Department of Conservation, 1965

and its tributaries.

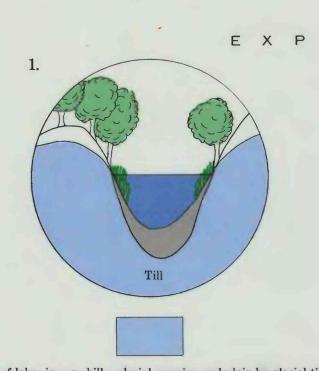
From Minnesota Department of Conservation, 1965

WATERFOWL PRODUCTION VALUES ARE HIGH IN THE PRAIRIE AND THE

has damaged the upland areas but has increased sedimentation in some of the lakes.

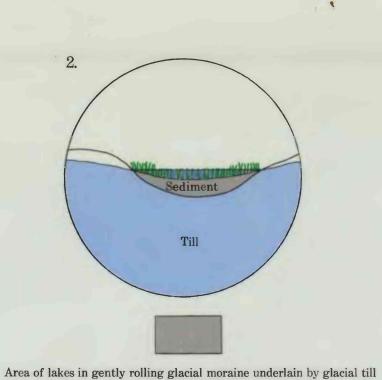
INTERIOR-GEOLOGICAL SURVEY, WASHINGTON, D.C.-1969-W68160

THE DISTRIBUTION OF FISH IS CONTROLLED BY THE SUITABILITY OF WATER AVAILABLE.—Walleye are most common in the clear water of the lakes with sand and gravel bottoms. Bass and pan fish are most common in the highly productive lakes underlain by glacial till in the prairie and western woodland part of the watershed. Bullhead and roughfish are common in the Red River of the North



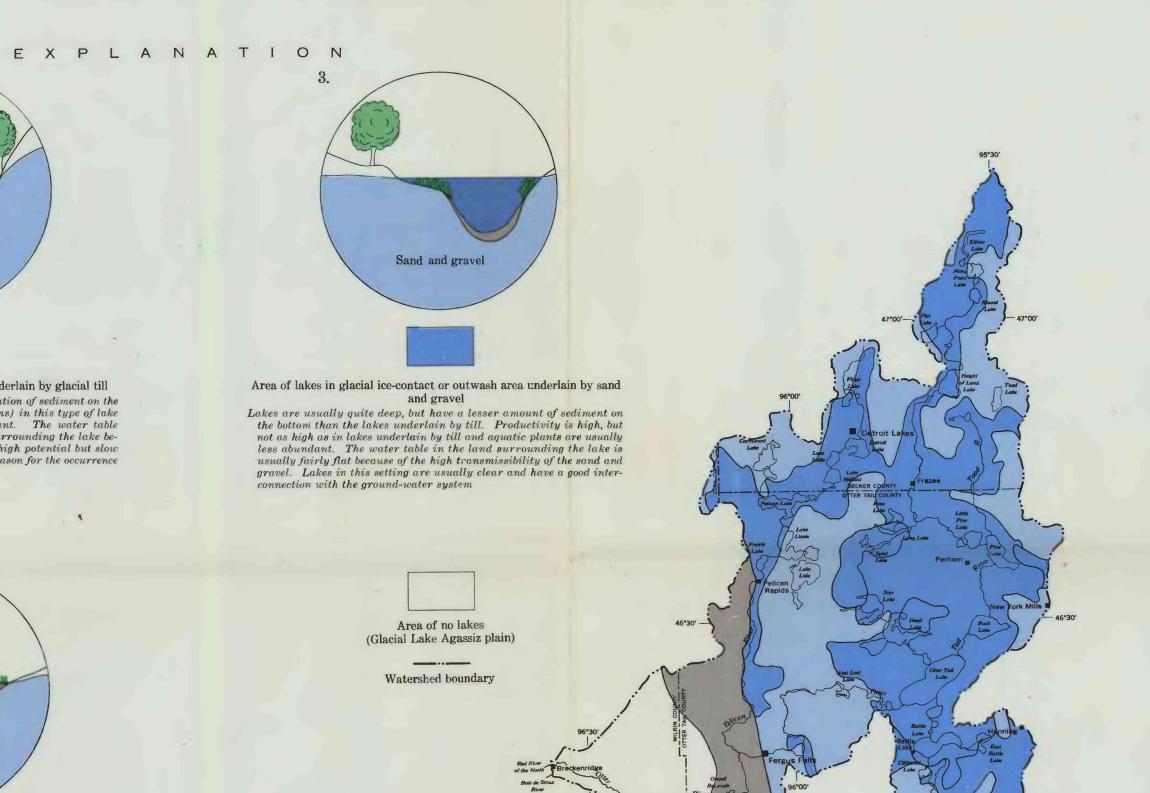
Area of lakes in very hilly, glacial moraine underlain by glacial till

Lakes are usually deep and have a thick accumulation of sediment on the bottom. Productivity (the total living organisms) in this type of lake is high and aquatic plants are usually abundant. The water table gradient is generally quite steep in the hills surrounding the lake because of the tightness of the till. This causes high potential but slow ground-water movement to the lake and is the reason for the occurrence of many springs surrounding these lakes



(prairie potholes)

Lakes and marshes are usually shallow and have a relatively large accumulation of sediment on the bottom. Productivity is extremely high and aquatic plants usually cover the entire lake area. The water-table gradient in the surrounding land is not steep and at certain times of the year might actually be lower away from the lake than in the lake, indicating potential recharge to the ground-water system. However, the impermeability of the bottom sediments probably allows only a small amount of water to move into the ground-water system

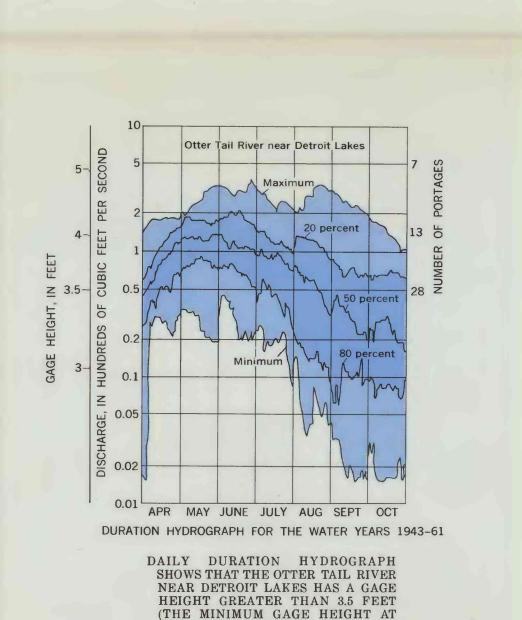


LAKES IN THE OTTER TAIL WATERSHED CAN BE CLASSIFIED BY THEIR GEOLOGIC AND GEOMORPHIC SETTING INTO THREE BASIC TYPES: 1. LAKES IN VERY HILLY GLACIAL MORAINE UNDERLAIN BY GLACIAL TILL, 2. LAKES IN GENTLY ROLLING GLACIAL MORAINE UNDERLAIN BY GLACIAL TILL, AND 3. LAKES IN ICE-CONTACT AND OUTWASH AREAS UNDERLAIN BY SAND AND GRAVEL

This is a general classification and there are many characteristics of the water one of the basic controls

intermediate types and mixing of types within the areas shown. Although lakes are influenced by climate, vegetation, and chemical and biological

EXPLANATION



WHICH THE RIVER IS GENERALLY NAVIGABLE BY CANOE) OVER 80

PERCENT OF THE TIME FROM THE

The occurrence of a gage height of 3.5 grad-

ually declines to 50 percent of the time by the

middle of August and to about 30 percent of

the time during September and October. Number of portages indicated are for a canoe trip from Height of Land Lake to Brecken-

MIDDLE OF APRIL THROUGH JUNE.-

For normal flow the minimum gage height, in feet, of the Otter Tail Most undeveloped, natural reach of river but is unpredictable for River near Detroit Lakes at which the reach of river is generally canoeing because of nearness to headwaters. Much wildlife navigable by canoe Gage on Otter Tail River near Detroit Lake Relatively natural reach of river. Watershed boundary Marshy banks. Much wildlife Farms fairly common along this reach of river. Marshy banks. Many lakes with much recreation activity, including many power boats. Some wildlife Farms fairly common along this reach of river. Relatively high banks covered with deciduous trees. Some wildlife Polluted reach of river. Many farms 46° along banks with trash dumps THE OTTER TAIL RIVER IS VERY FAVORABLE FOR CANOEING THROUGH-OUT MOST OF ITS LENGTH.—The large lakes can be dangerous at times because of large waves caused by sudden thunderstorms and they are much used by power boats, but most intervening stretches of the river are very enjoyable for canoeing. Wildlife and birds are fairly abundant throughout most of its length. The river stage is most favorable for canoeing through June (See hydrograph). September and

October are the only months when the gage height is generally less than 3.5 feet for

more than 50 percent of the time. Downstream from Orwell Dam the river is

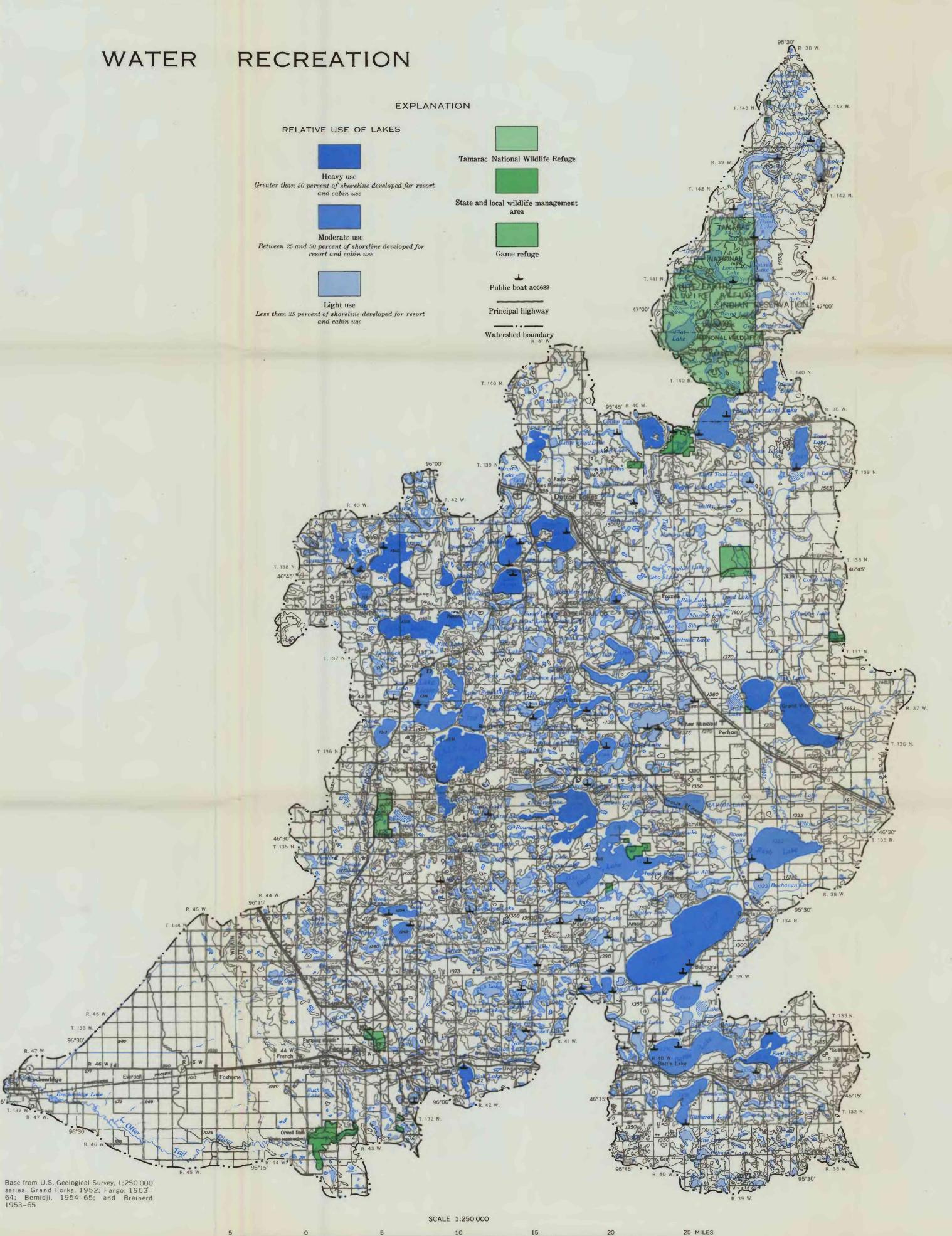
Data from Minnesota Department of Conservation

polluted and has unsightly banks.

SELECTED LAKES Surface area Length of shoreline Ecological classification Vegetation (only abundant types) Shoreline description oxygen (ppm) (ppm) 10% rubble, 10% gravel, Walleye, small mouthed Bass, Except for bulrush, plants occur between West Battle 5,509 113 20 205 15-20 foot depth. 69 35 Bass, panfish, Walleye. Submergent aquatics between 6'-20' contours. Clitherall 2,538 200 43 10 Dead 7,708 Pelican 4,128 51 Walleye. 220 7.0 (listed as turbidity) 5% rubble and gravel, N. half 11.5 Lizzie Hardstem bulrush, cane, muskgrass. 40% sand, 55% muck. Waterfowl. Mostly sand and gravel. 5,338 Boggy on east side and Plants grow to 8' depth. Pondweed, milfoil, coontail, bulrush. 6.0 Sand-rock-mud outwash. 5% boulder, 15% gravel, Little Pine Aquatics quite sparse. 10% sand, 70% clay. 19 Varies: sand, rock, Aquatics quite sparse. 248 bog, muck. Walleye, Northern Fike. Large mouthed Bass, Walleye. 165 9.5 Bulrush. 3% muck, 2% mud, 5% Pondweed (floating leaf); muskgrass. Walleye, Northern Pike. Sand and gravel. Shoals are 90% sand and East Lost Large mouthed Bass. Milfoil (water); muskgrass. gravel, 8% muck. 60% rubble and boulder, Large mouthed Bass, panfish, Marion 20% gravel, 17% sand, 3% muck. Shoals are 10% gravel, 25% sand, 40% muck Muskgrass, aquatic plants to 12' depth. and marl, 25% rubble. 10% rubble, 30% gravel, 792 9.2 Jewett (listed as turbidity) 50% sand, 10% bog. 6.8 West Silent (listed as turbidity) 73 29 30% rubble, 30% gravel, Aquatics sparse in main lake. Heavy in west 618 8.0 Northern Pike, Walleve. 40% sand. 66 27 70% Tubble 3.11. 70% rubble and gravel, 3,272 Aquatics to 18' depth; cover 20% of lake. Bass, panfish, Walleye, 10% rubble, 5% boulder, Detroit 2,023 Plants moderately abundant on west. Northern Pike. 20% gravel, 65% sand. Water milfoil, Canada waterweed, pondweed Melissa 1,791 40% gravel, 60% sand. Hardstem bulrush, pondweed (Berchtold's 30% gravel, 60% sand, Sallie 1,262 6.9 Aquatics to 12' depth north bay. Aquatics Large mouthed Bass, panfish, 9.6 S Big Floyd 1,162 to 20' depth south bay. Cover 10% of Northern Pike, Walleye. 8.3 N 25 19 30% boulder, 45% gravel, Walleye, Northern Pike, Cotton 7.7 Large mouthed Bass, panfish. Height of 20% boulder and gravel, Large mouthed Bass, panfish, 21 75% sand, 5% muck. Big Toad 29 1,666 9 Mud bog, rock and sand. Emergent vegetation; Bulrush to 5' depth. Many Point 1,716 Submergent aquatics moderately abundant Hard, fine-sandy muck with some rocky and Island 1,160 rubbly beaches. Soft

muck in north bay.

Thermocline is the plane of maximum rate of decrease in temperature with depth in a lake. 2 Depth at which secchi disk disappears as it is lowered into and raised from the water. It is a measure of the clarity of the water

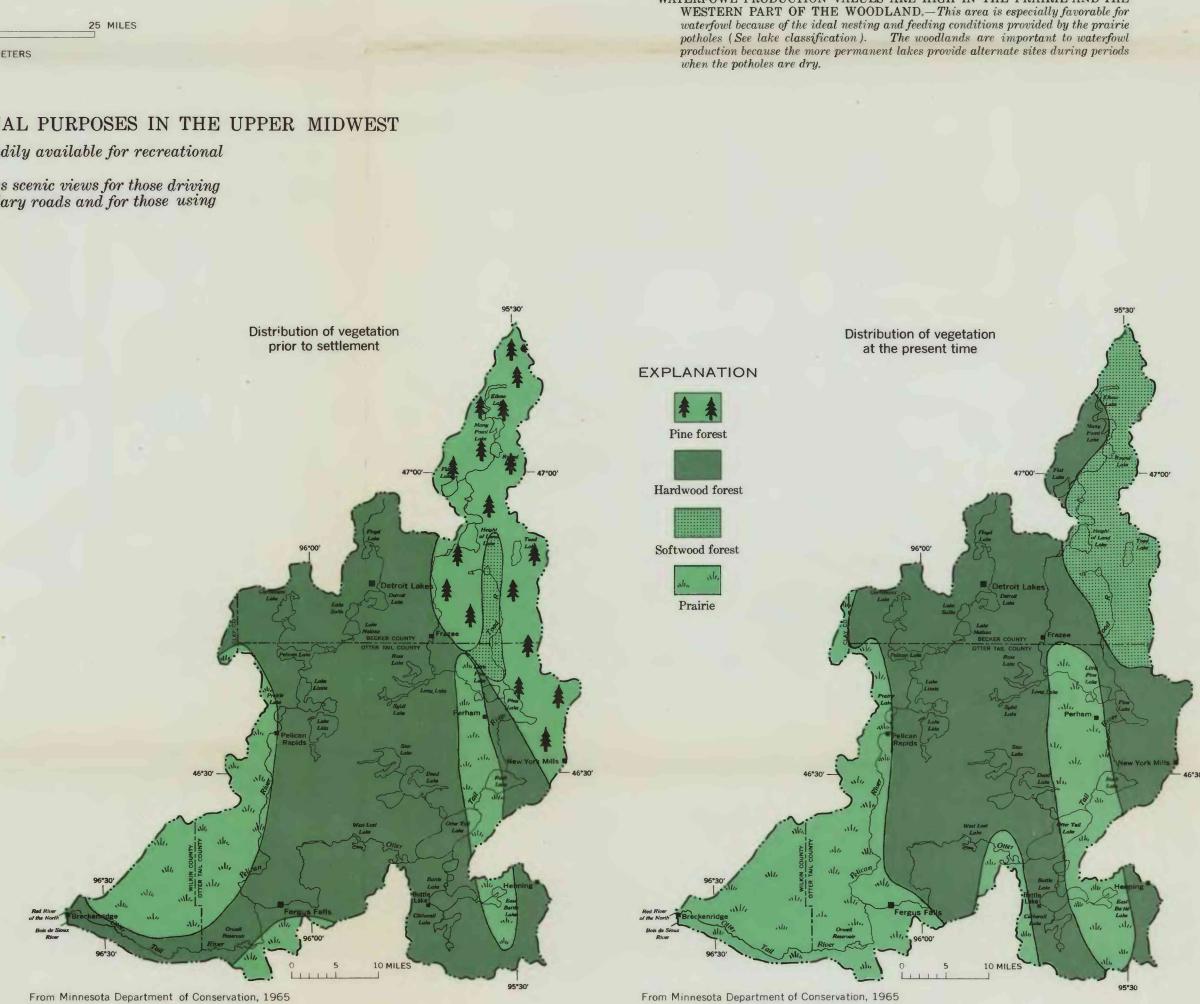


LAKES IN THE OTTER TAIL AREA ARE AMONG THE MOST HEAVILY USED FOR RECREATIONAL PURPOSES IN THE UPPER MIDWEST

Some of the largest lakes throughout the watershed and many of the lakes in the vicinity of Detroit Lakes have large numbers of people use.

CONTOUR INTERVAL 50 FEET

lakes in the vicinity of Detroit Lakes have large numbers of people swimming, fishing, boating, and water skiing during most of the summer. The presence of many public boat accesses in the area on the many principal and secondary roads and for those using the water recreational facilities.



BEFORE THE SETTLERS CAME TO THE OTTER TAIL AREA DECIDUOUS FORESTS OF MAPLE, BASSWOOD, AND OAK EXTENDED TO THE RED RIVER OF THE NORTH ALONG TRIBUTARY STREAMS AND NORWAY AND WHITE PINE FORESTS COVERED THE NORTHEASTERN PART OF THE WATERSHED openings that are being farmed. This change in forest cover clearly shows the effect man has had on the landscape. Forest clearance on this scale changed the runoff characteristics of the area considerably and was the cause of widespread erosion. This not only

scape. The areas shown are very general and the forests as they stand today have many